Market Analysis
Program (MAP)

Industry Sector Markets 1989-1994

Federal Government Sector

Volume I

INPUT®

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FEDERAL GOVERNMENT SECTOR

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I

Introduction

A

Overview

The federal government's information systems have evolved to provide a wide range of mission support functions, as well as the information processing essential to the federal government's operations. These systems have grown in capabilities and complexity as technological advancements have been incorporated into federal modernization efforts. Further systems will become even more versatile as standards promoting interoperability are implemented and as steps are taken to elevate the federal information processing systems to the current commercial technological level.

B

Federal Market Driving Forces

The federal market for information systems is expected to grow at an compound annual rate of 12% over the next five years. This growth will be driven by the goals and objectives listed in Exhibit I-1.

EXHIBIT I-1

Federal Market IS Goals and Objectives

- Improve information technology support
- Improve productivity
- Maintain and enhance systems
- Increase contracting out
- Overcome staff shortages

Government programs require steady improvement in the quality and quantity of information technology support. In its drive to improve productivity—to do more with less—the federal government is growing increasingly reliant on information technology. At the same time, functional and pricing trends—especially in terms of microcomputers and associated software—have opened up new opportunities in government for using technology.

Federal agencies continue a heavy commitment to maintain and enhance existing systems, as well as develop new systems. However, staff shortages effectively prevent in-house performance of these tasks. Further, pressure to reduce the federal budget deficit increases the importance of efficiency and innovation.

Government regulations have encouraged the contracting out of many in-house activities, including information systems support. The growing emphasis on OMB Circular A-76, as well as the Executive Order 12615 ("Performance of Commercial Activities"), emphasizes the bias toward contracting out. At an increasing rate, agencies must use information services firms to take advantage of technology and reach their productivity goals.

Federal personnel policies are also driving an increase in the use of information services vendors. Almost all agency executives whom INPUT interviewed cited difficulty in hiring staff with strong technical credentials. In the Washington area, at least, good candidates can frequently obtain higher salaries and better benefits in the private sector than in government. Thus, many employees with fewer than 15 years of service are leaving government, causing agency executives, usually with more than 20 years of service and looking toward retirement, to contract out most of their technical support activities.

C

Issues for Vendors and Federal Vendor Characteristics

Vendors to the federal information services market identified several characteristics of their products and services that they believe are important in winning federal government contracts as shown in Exhibit I-2. Vendors in several delivery mode sectors were asked to rate the importance of these characteristics. Price is viewed as the most important characteristic for winning awards by the hardware, professional services, and systems operations (also referred to as facilities management) vendors, giving it the highest overall average importance rating. This is due to both the price/performance emphasis of the information services being acquired and the increasing competition for government contracts throughout industry segments. Vendors are also more aware of the need for government agencies to hold down costs, and they are pricing their products and services accordingly. Recent federal budget cuts, especially in DoD, are aggravating this problem.

EXHIBIT I-2

Characteristics of a Successful Information Services Contractor

Characteristic	Vendor Ratings*					
	Software Vendors	Microcomputer/Hardware Vendors	Systems Integrators	Professional Services Vendors	Facilities Management Vendors	Overall Average
Price	4.3	3.8	3.9	4.5	4.6	4.2
Software development experience	4.6	3.5	3.9	3.7	3.7	3.9
Federal contract experience	3.8	3.1	4.0	3.6	3.6	3.6
Integration experience	4.1	2.8	4.3	3.7	3.3	3.6
Support	4.3	3.2	3.9	3.0	3.5	3.6
Staff experience	3.6	3.0	3.7	3.9	4.0	3.6
Agency experience	3.2	2.9	3.7	3.6	4.1	3.5
Application functional experience	3.8	3.0	3.7	3.4	3.7	3.5
Hardware experience	3.9	3.5	3.2	3.0	3.5	3.4

* Rating: 1 = Least important
5 = Most important
◯ = Highest rating for each category of vendor

Updated 1989

Software development experience is most highly rated by software vendors, and integration experience received the highest rating by systems integrators. Software development experience also has significant importance to most industry segments, and it has the second highest overall average rating. Federal contract experience had a rating similar to

application functional experience. This may be due in part to vendors in the federal marketplace building on existing federal contract experience to acquire additional awards. These vendors are also gaining specialized knowledge of specific government applications. In comparison, agency experience does not get as high a rating; thus vendors may not view their experiences within agencies to be as important as their federal government contract experiences overall.

The importance to each industry section of staff experience and support differed by a greater extent than some other characteristics rated in Exhibit I-2, although their overall averages were similar. The highest ratings came from software and systems integration vendors, the sectors with more of an end-user/people orientation, while the lowest ratings are from the hardware vendors.

D

Issues for Information Services

The changing environment of the information services markets arises from several key issues that strongly influence both the suppliers and end users in the federal market sector. These issues are listed in Exhibit I-3. These influences will extend into the 1990s.

EXHIBIT I-3

Issues for Information Services

- Transition from data orientation to information orientation
- Changing acquisition methods
- Implications of standards
- Shakeout of markets
- Price versus technology

For several years the government has been transitioning from merely processing data to becoming more information-oriented. The federal agencies need to be able to readily access, exchange, and store the enormous collection of information that is essential to their operations and to the public. Another evolutionary process in the government is its

method of acquiring information systems and services. The emphasis on cost and risk containment has caused a migration to fixed-price contracts and closer scrutiny of procurements.

The 1990s will be a time for implementing several industry standards for interoperability and compatibility. Transition to POSIX and GOSIP should be progressing since these standards will be made mandatory. Also, further standardization is likely in the areas of communication protocols and system interfaces.

The industry will continue to experience market shakeouts, brought about by a continued consolidation of players, new entrants, and open competition introduced by the Competition In Contracting Act (CICA). Congressional demands that the market be opened to an increasing number of vendors, particularly small businesses, in the midst of budget cutting measures poses threats to established federal vendors.

The federal government often states its preference for awarding contracts based solely on the appropriateness of the proposed technical solution. However, in the agencies' struggle to adhere to constrained budgets yet satisfy congressional oversight demands, awards for information services are made more frequently according to price rather than the technology. Furthermore, budget limitations hinder modernization and upgrades of information systems. This prevents many agencies from realizing the advantages of new technological capabilities that are needed to take them into the next decade.

E

Issues for Agency Users

The federal government uses information services vendors to overcome in-house staffing limitations and budget constraints, and to apply the higher level of available experience and expertise of the vendor. Exhibit I-4 depicts the issues that concern the federal agency end users, identified in other INPUT reports.

The most frequently mentioned issue is the demand that agencies comply with industry standards. The administration is seeking to have standards such as POSIX and GOSIP gain a stronger hold throughout the federal government. Despite oversight mandates, some offices continue to resist the transition. Another important issue is the apparently inadequate level of planning and management skills of contractors. This suggests that vendors need to demonstrate to government end users that they are making a concerted effort to satisfy the agencies' requirements and expectations.

EXHIBIT I-4

Issues for Agency Users

Federal Agency Issues	Rank*
Vendor compliance with industry standards	1
Planning and management skills of federal contractors	2
Level of experience for vendor staff	3
Vendor cooperation and responsiveness to agency needs	4
Availability of compatible software	5

* Rank based on frequency of mention by agency respondents.

In most cases, the contractor's staff is conducting services deemed important to the federal agency's mission and information system support. Therefore, the experience level of the staff should be appropriate to accomplish the awarded tasks. Any shortfalls in expertise and skills of the contractor's staff could be a deterrent to achieving those productivity gains that agencies expect through use of contractor personnel. Also, the vendor community is viewed by some government users as not being responsive to their needs. This situation would be improved if better channels of communication were developed between the government officials and contractors. However, ferocious cost cutting on some major contracts may preclude improvements in service quality.

Finally, as agencies have greater pressure to increase productivity and as agency resources become further constrained, the government's need for compatible software will increase. Agency respondents noted a growing need for portable software that is readily adaptable to a changing hardware environment. As new hardware technologies are put in place, the next generation of software must accommodate change and communications between incompatible equipment.

II

Market Forecasts

The U.S. government continues to be the largest user of information technology in the world. More than 120,000 federal workers currently manage approximately 22,000 medium- and large-scale computers and over 500,000 microcomputers. In 1989, nearly $18 billion was spent on information technology, of which almost three-quarters was for contracted products and services.

The success of virtually every major federal program depends on productive use of information technology. Not only is information more available today than even five years ago, it is also more widely dispersed.

Early in the computer age, the federal government far outdistanced the private sector in development and use of information technology. Federal agencies developed automated information and service delivery systems early on, initially for defense and later for civilian applications.

However, by the late 1970s, the federal government lost its leadership position in computer applications. Its inventory consisted largely of outdated, cost-ineffective systems. The change occurred as a result of the following factors:

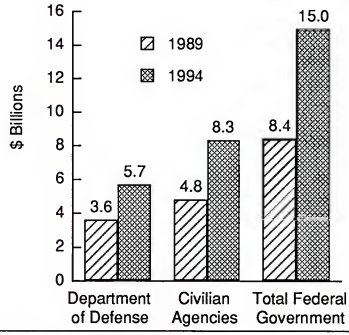
- A highly concentrated, overregulated procurement process
- Frequent turnover in leadership, leading to changing priorities and volatile resource levels
- Personnel policies that drove many of the needed technical personnel out of government

Despite the worsening of these conditions, the government has initiated many major projects to modernize its information systems. The projects underway and on the drawing board will alter many of the ways in which the government functions.

The industry-specific contracted portion of the federal information systems budget will grow from $8.4 billion in fiscal year 1989 to $14.8 billion in fiscal year 1994, a compound annual growth rate (CAGR) of 12%. As shown in Exhibit II-1, both the defense and civil sectors show roughly the same growth rate. This represents a lower increase in both civilian and defense growth rates from last year's forecast. The lower increase in growth rate reflects the reduction, in inflation-adjusted dollars, of the overall budget to meet deficit controls imposed by the Gramm-Rudman-Hollings Act. However, the civil agency market continues to grow slightly faster than the Defense Department which is further hampered by a new round of long-range cuts. The larger increase in civilian growth rate also reflects the expected long-term realization of several major civilian initiatives, including:

EXHIBIT II-1

Federal Government Sector Market Forecast DoD versus Civilian Sectors, 1989-1994 (Calendar Year)



	Department of Defense	Civilian Agencies	Total Federal Government
1989-1994 Comp. Annual Growth Rate (Percent)	10	12	12

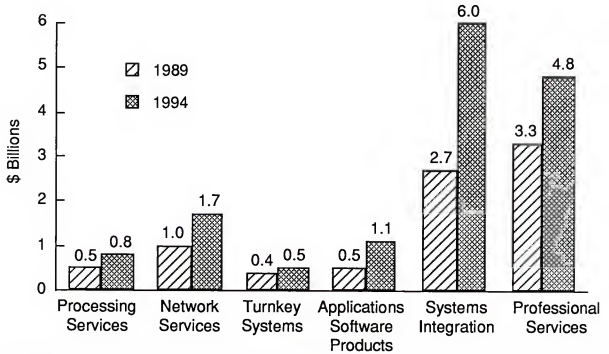
Updated 1989

- Internal Revenue Service Tax Modernization Effort
- Bureau of Land Management ADP Modernization Project
- Department of Agriculture Geographic Information System (GIS)

As in the other INPUT Vertical Industry reports, INPUT focuses on six key delivery modes as illustrated in Exhibit II-2. The remainder of this chapter discusses these delivery modes, with comparisons of DoD and civilian markets in each delivery mode. Exhibit II-3 breaks out the six delivery modes for the defense sector, and Exhibit II-4 does the same for the civilian sector of the federal government.

EXHIBIT II-2

Federal Government Information Services Markets by Delivery Mode, 1989-1994



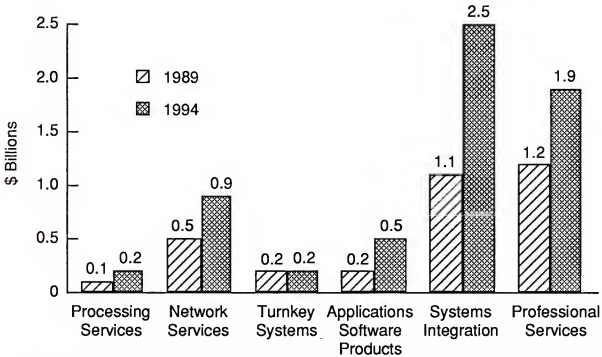
	Processing Services	Network Services	Turnkey Systems	Applications Software Products	Systems Integration	Professional Services
CAGR 1989-1994 (Percent)	10	10	3	18	18	8

Updated 1989

Note: CAGR may not calculate due to rounding.
See Exhibit FG-A-1 for details.

EXHIBIT II-3

Department of Defense Information Services Markets by Delivery Mode, 1989-1994



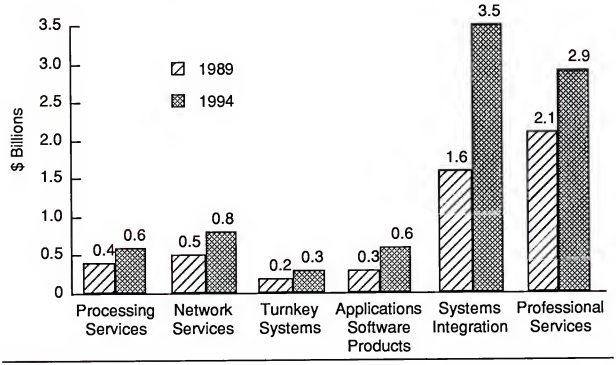
	Processing Services	Network Services	Turnkey Systems	Applications Software Products	Systems Integration	Professional Services
CAGR 1989-1994 (Percent)	15	12	4	20	18	10

Updated 1989

Note: CAGR may not calculate due to rounding.
See Exhibit FG-A-1 for details.

EXHIBIT II-4

Civilian Agencies Information Services Markets by Delivery Mode, 1989-1994



	Processing Services	Network Services	Turnkey Systems	Applications Software Products	Systems Integration	Professional Services
CAGR 1989-1994 (Percent)	8	10	8	15	17	7

Updated 1989

Note: CAGR may not calculate due to rounding.
See Exhibit FG-A-1 for details.

A

Processing Services

Processing services includes interactive and batch processing services and systems operations of vendor-owned systems. Over the past few years, the growth rate for processing services has shown some decline. However, the current forecast shows an increase in this growth rate.

For several years, the growth of microcomputers caused a dampening of demand for processing services. Now, however, these micros are connecting into vendor-owned computer systems, downloading data, revising and displaying it in various ways, and uploading it back to the mainframes. This is driving an increase in growth, as agencies require more data sharing.

The demand for processing services in the civilian sector is more than four times as large as that of the defense sector. This difference occurs primarily as a result of the Department of Energy and NASA, which make heavy use of vendor-owned facilities management arrangements. This is partly tradition, but it also reflects the difficulty these two agencies face in recruiting the technical talent to staff their scientifically-oriented computer centers.

B
Network Services

Network services consist of:

- Value-added network services (VANs)
- Electronic mail
- Electronic funds transfer
- Electronic data interchange (EDI)
- Electronic information services, including data bases, news, and videotex

Like processing services, network services will grow 10% annually, but from a larger base. In this case, the defense sector represents a slightly larger market than the civilian sector, reflecting the far-flung nature of DoD operations. This trend continues despite defense budget cuts. Network services is the only delivery mode in which defense spending exceeds that of the civilian agencies.

Again, the growing acceptance of microcomputers, which earlier retarded this market, is now enhancing it. As federal users become more sophisticated and demanding in using micros, fewer leave their micros in a standalone mode. Rather, in addition to accessing computer centers, they also access public and private data bases and news services, using VANs to link with a wide variety of products and services. In this way, microcomputers are spurring the growth of the federal network services market.

EDI is receiving much attention in the government. Although its growth in the federal market lags that in the private sector, it is still becoming quite popular. INPUT expects that in the early 1990s EDI will account for an increasing part of network services growth. Unlike most other delivery modes, EDI prospects are actually enhanced by budget cuts. Federal managers can save much of their administrative expense by reducing paperwork. Greater automation of procurement, invoicing, human resources, and other administrative functions through EDI will reduce expenses and increase accuracy and efficiency.

C

Turnkey Systems

Turnkey systems are value-added packaged hardware and software solutions to specific applications requirements that satisfy, with few modifications, commercial, industrial, and government needs. In this delivery mode, the defense sector is nearly flat, resulting from sharp budget cuts in FY 1990 appropriations.

Scientific and engineering applications represent the largest area of turnkey system usage. These include CAD, CAM, CIM, and data collection packages. On the civilian side, NASA and the Department of Energy have the greatest need for these systems and support most of the civilian growth. Defense also has growing requirements in this area, but currently lacks the means to satisfy these needs.

Document handling represents the second largest application area. This includes, among other applications, DoD's initiatives on CALS (Computer-aided Acquisition and Logistics Systems). However, some CALS-related initiatives were cut from the current budget. Other document-handling applications include library, graphics, mapping, and publishing systems.

Other turnkey applications include:

- Human resources
- Fleet scheduling
- Maintenance tracking
- Medical drug information
- Financial systems

D

Systems Integration

In some respects, systems integration is similar to turnkey systems. Both typically involve equipment, packaged software, and customized software. However, systems integration is generally oriented toward solving a particular client's problems, whereas the turnkey business is more oriented toward development and installation of a single application that requires little or no customization. Such an application is then useful in a large number of organizations.

The systems integration market growth responds to a variety of factors:

- Unchanged federal personnel policies drive most technical experts out of government, leading to greater reliance on the private sector.
- Heavy commitment of the available federal work force to maintain existing systems emphasizes the need to reduce life cycle maintenance costs by introducing more efficient software and more reliable hardware, customized in a systems integration mode.
- A continuing increase in the ratio of federal software-to-hardware costs lends emphasis to the utilization of more efficient, commercially designed and developed information systems.
- Federal agencies seek to increase risk sharing with their vendors through a fixed-price systems integration contract approach.

Although the civilian sector growth starts from a larger base, INPUT expects it to grow slightly slower than defense. This is based on the programs identified in agency long-range plans, rather than any distinctive trends between civilian and defense agencies. In general, the defense agencies have identified more major but lower-valued initiatives requiring systems integration support. INPUT expects some catch-up in defense SI spending by the mid-1990s.

E

Applications Software Products

Civil agencies will spend slightly more than defense on applications software products, with the defense sector growing somewhat faster.

As a result of budget constraints and heavy pressure from OMB, many agencies are beginning to view their requirements in other than unique terms. When they have a fairly standard application, particularly an administrative application, they acquire standard packages more often than before. This leads to an increase by vendors to develop packages that are suitable for government use, as well as an increase in government-oriented marketing efforts.

One area receiving much attention is standard financial packages. The Joint Financial Management Improvement Program (JFMIP) issued a Core Financial System Requirements document for agency use. In connection with this JFMIP requirement, GSA issued contracts to Computer Data Systems, Inc. and American Management Systems for certain Core-compliant software. INPUT expects several additional vendors to be approved for Core-compliant software shortly.

With the arrival of the Bush administration, the federal software certification trend accelerated. JFMIP is expanding its activites, and OMB suggested standard approaches for human resources and procurement. INPUT expects this trend to continue, at least through the early 1990s.

F

Professional Services

Professional services includes consulting, education and training, software development, and systems operation of client-owned facilities. The civilian sector starts from a much higher base in 1989, but will grow slightly slower than defense. As previously discussed, both NASA and the Department of Energy traditionally rely on private-sector professional services to a greater extent than most other agencies. This situation, combined with periodic legislation aimed at discouraging defense establishments from contracting out, has held down the defense number.

1. Programming and Analysis/Software Development

Programming and analysis services, also called software development, include:

- Hardware and/or software system design
- Custom software development
- Modification of commercial software products
- Software testing of custom and commercial packages
- Software conversion
- Maintenance of operating and applications software
- Independent verification and validation (IV&V) of software packages prepared by other vendors

This service mode should continue to grow rapidly during the forecast period and is the largest submode in professional services. The current and continuing shortfall in programming skills of the federal government sector is the most significant factor behind the projected growth. Government staffing limits and the backlog of software maintenance tasks of most government data centers also contribute to the demand for vendor assistance in this service mode.

Agencies appear committed to maintaining and increasing the effectiveness of existing software. The trend, as discussed above, will be the purchase of more off-the-shelf packages and the use of professional services to modify the packages to suit unique needs.

This segment will remain strong until the agencies retrain or replace current staff and resolve the software maintenance problems associated with earlier custom software practices and manual software development procedures. The principal dampening factor for this submode is the growing availability and functionality of software products.

2. Consulting Services

Consulting services in the federal market provide support to information systems and/or services. Examples of government consulting services contracts are:

- Feasibility studies
- ADP requirements analyses
- Systems audits
- System Engineering and Technical Direction (SETD)
- System Engineering and Technical Assistance (SETA)

The primary growth factor is the agencies' need for assistance in producing the technical justification for planned improvements in information technology resources during this period. The agencies are understaffed in the technical planning and evaluation areas. This market will remain fairly flat during the forecast period.

3. Education and Training

Education and training services relate to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and software maintenance. The government normally contracts for the following separately from systems integration programs:

- Training programs
- Books and manuals
- Seminars
- Automated training systems

The principal focus of training will be the large number of fourth-generation replacement systems of ADP architectures of the IBM System 360-370 era. The dynamics of end-user computing, local-area networks, distributed processing, and new software will require retraining of more than half of the current agency ADP work force, reversing the earlier (1986) reductions. Unfortunately, the Gramm-Rudman-Hollings Act cuts heavily affected agency education and training budgets. This market will also remain flat during the forecast period.

4. Systems Operations/Operations and Maintenance

Professional services systems operation (PSSO) is also referred to as government-owned/contractor-operated (GOCO). GOCO also includes standalone operations and maintenance (O&M) contracts, which differ from PSSO in that the vendor has less or no direct management/control of the facility. The computing equipment is owned or leased by the government, not the PSSO or O&M vendor; the vendor provides the staff to operate, maintain, and manage the government's facility. This category is growing faster than any other within professional services. Typical contract tasks include:

- Operation, maintenance, and management
- Operation and maintenance
- Hardware maintenance
- Third-party maintenance
- Software maintenance
- Site preparation and installation

This submode had been considered a mature market in the federal government, with limited growth prospects. Third-party maintenance activities will increase, however, as more agencies turn to competitive approaches to increase competition and better comply with the Competition in Contracting Act. Further, continuing staff constraints are causing more agencies to contract out their systems operations activities.

III

Competitive Developments

A Market Considerations

1. Market Characteristics

Vendors of information services and software to the federal government may be categorized by the extent of their exclusivity with federal clients.

- At one end of the continuum are firms that work almost exclusively on federal contracts. Many of these are small firms that have expertise in such services as design and engineering, or are known for their "body shop" programming and analysis capabilities. This group also includes several major not-for-profit firms, colleges and universities, and in-house government data centers with excess capacity, all of which compete with commercial federal contractors. Minority-owned firms (some of which operate under special rules) and retired military personnel (who work as independent consultants) complete the categories of contractors who support the federal government exclusively.

- The middle group on the continuum tends to be very large contractors that have very large, separate commercial and federal operations. Although some of these vendors provide a single type of service, most are capable of providing full service, either by themselves or with one or more partners.

- At the other end of this continuum are vendors that have a federal presence, but whose presence is secondary to a commercial line of business. That is, these vendors contract with the federal government because they have a desired capability, not because they have a priori selected the federal marketplace.

Most of the largest vendors to the government are part of the middle group. They derive a significant percentage of their total information systems revenue either directly from the federal government or as subcontractors to other companies performing work under government contracts. This dependency upon the federal government has had a profound effect upon vendors' earnings, management, organizational structure, employees, and the commercial market.

These government vendors, as well as larger vendors in the first group, tend to attract and recruit into their management ranks a high proportion of ex-government employees who understand how to navigate the complexities and deal with the competitiveness of government procurements. Many of the leading vendors in the industry tend to establish a federal marketing group that handles their government operations. The industry vendors surveyed reported anywhere from 20 individuals to over 7,000 employees in their federal operations.

The market sales cycle for the federal market is lengthy. Many vendors target large systems two years in advance, while smaller programs might take eight months to market after they are announced in the Commerce Business Daily. The majority of the industry respondents noted that procurements have become lengthier due to closer examination of procurement practices and potential protests of the awards. Also, there is some development of long-term relationships and more trust among competitors due to greater involvement in teaming and subcontractor arrangements.

2. Key Applications and Technologies

Several key applications and technologies will have an impact on the federal information systems market over the next few years. Industry respondents were asked to rank factors they view as most significant to the federal market (Exhibit III-1). Information management is viewed as the leading application driving the government's use of contracted services. The federal agencies will continue to modernize their information systems to enhance the accessibility and management of information as part of their efforts to be more efficient and productive. The need for greater information sharing is key to this factor.

The federal agencies have planned major telecommunication initiatives for implementation over the next five years, which will stimulate demand for vendors' products and services. Also, the proposed revisions of agency telecommunication policies and new standards that are being developed and implemented (especially Open Systems Interconnection standards) are impacting these future telecommunications acquisitions and will serve as controlling criteria for selection of voice and data systems and services. The FTS 2000 contract is, in one sense, creating its own set of standards.

EXHIBIT III-1

Key Applications and Technologies

Application/Technology	Rank*
Information management	1
Telecommunications	2
Financial and administrative	3
Local-area networks	4
Secure networks	5
Electronic services	6

* Rank based on frequency of mention by industry respondents.

Furthermore, the government is increasing its use of local area networks (LANs) to handle the distribution and sharing of information both within agency organizations and externally. LANs being developed will incorporate agency requirements for higher data speeds and increased accuracy in their technical design, as well as greater ease of use.

At present, the emphasis of federal information systems is on support of financial and administrative applications. The large volumes of invoices, payments, transfer of funds, and administrative processes in the government require that information systems be efficient and highly cost-effective so that agencies can accomplish their missions through use of their allocated computer resources. As the government acquires additional computing power and information systems expand, more technical and scientific applications will be developed.

Throughout the government there is increasing acquisition of TEMPEST-tested and related electronically secure hardware and software. Civil agencies are awaiting new computer security guidelines from the National Security Agency and the National Institute of Standards and Technology (NIST, formerly the National Bureau of Standards). Security and privacy issues associated with personal computers have not yet been uniformly addressed across the federal government, but progress has been made since the passage of the Computer Security Act.

Electronic services such as electronic mail and Electronic Data Interchange (EDI) will gain in usage and be adapted for additional applications, in conjunction with the government's goal of reducing the paper burden. Already the DoD and various civil agencies have developed programs based on electronic services.

As future technologies become available, the role of electronic services will be more critical to agency mission support functions and government operations.

3. Market Growth

INPUT's survey revealed that in all but two categories of contracted services, a majority of industry respondents expect an increase in the amount of services to be acquired by the government over the next five years, as shown in Exhibit III-2. The largest increases anticipated are in systems integration and professional services, where expected increases in revenues were estimated at 25%. Vendors foresee a 10-25% increase in revenues for network/electronic information services.

EXHIBIT III-2

Vendor-Projected Changes in Information Services Contracting Over the Next Five Years

Delivery Mode Segment	Proportion of Respondents (Percentage)		
	Expected Increase	Expected Decrease	No Change
Professional services	68	16	16
Processing services	16	34	50
Application software products	40	20	40
Network/electronic information services	50	16	34
Systems integration	68	16	16
Turnkey systems	34	—	66

Forty percent of the vendors surveyed view the government's increased use of packaged software as not hindering the professional services market, while the same percentage see the market increasing 15% to 25%. The respondents were of the opinion that there will still be ample opportunities for modification, installation, training, and integration of software by professional service vendors. INPUT does not agree with this position, since growing availability and functionality of packaged software reduces the need for custom software development. Furthermore, vendors have commented that the federal agencies do not have the necessary in-house expertise to perform many of the software-related services.

B

Leading Federal Vendors

This section lists the leading federal vendors in each of the six delivery modes. This information was derived from the following sources:

- Federal Procurement Data Center
- Interviews with agency and vendor officials
- Press accounts of various contract awards

In general, the leading players did not change much from last year's report, although the order changes somewhat every year. It is becoming increasingly difficult for new firms to gain a major share of the federal information technology market. As a result, some consolidation is occurring. Many leading outside firms, including Ford Aerospace, Emhart, and Cincinnati Bell, have bought smaller firms with heavy federal penetration.

1. Processing Services

The federal market for processing services has been very stable over the past few years in response to organizational, technological, and strategic changes. Up until this year, its growth had trailed far behind all of the other delivery modes, due primarily to the growth of end-user computing and the growing federal saturation by microcomputers. However, the need for interconnection, external file access, and more value-added services has caused the processing services market to improve somewhat. It still represents an opportunity for current vendors to recover investments but offers no real ROI for newcomers.

The major leading processing services and systems operations vendors in the federal market for calendar year 1988 are listed in Exhibit III-3. The market remains fairly concentrated, with several vendors accounting for most of the agency expenditures. This federal market continues to experience some consolidation. Several leading processing services vendors have acquired smaller vendors and their contracts, thereby increasing their share of the market. As a result of some vendor invoicing problems reported by GSA, the actual order of the vendors, in terms of market share, could not be determined.

EXHIBIT III-3

Major Federal Processing Services Vendors

- Computer Sciences Corporation
- Boeing Computer Services
- Martin Marietta Data Systems
- Control Data Corporation
- Dialcom

Major Federal Systems Operations Vendors

- Computer Sciences Corporation
- Unisys
- Boeing Computer Services
- Lockheed
- DP Associates
- Planning Research Corporation

All of the leading vendors offer at least two of the following processing submodes:

- RCS
- Remote batch
- Systems operations (previously facilities management)

Like other federal market areas, the processing services market has become more price sensitive. In many cases, agency workload has gone up without a corresponding budget increase. The trend is to buy raw computing power under the Basic Agreements, rather than the more expensive, technically supported Multiple Award Schedule Contracts (MASC).

Although contract audits will continue, some profit opportunities will remain, especially when the government fails to size its peak workload properly.

A vendor may offer heavily discounted rates within a specified workload window. However, if the government dramatically exceeds this window (as often happens), rates may rise to commercial levels. Theoretically, an audit of the charging algorithm will eliminate unbalanced charges. However, opportunities for high profits will continue to be available in specific situations.

2. Network/Electronic Information Services

Most of the top ten network services vendors listed in Exhibit III-4 have changed little over the past five years. Over this period AT&T has accounted for 44% of the market. Together, the top ten vendors accounted for 75% of the market.

INPUT expects AT&T to continue to dominate the network services market. However, the shares of others are expected to change, with award of FTS 2000 to AT&T and Sprint. In particular, U.S. Sprint will likely make the top ten in FY 1990. Sprint, as well as AT&T, will provide the media and support for both network services and electronic information services.

The nature of the overall federal telecommunications market is also changing in response to increasing data and facsimile demands, especially for higher speeds and distributed data needs. This will have a significant effect on the network services market. Vendors with specialized capabilities in such areas as EDI and videotex should profit in this market.

EXHIBIT III-4

Leading Federal Network Services Vendors

Company
AT&T
BBN
Bell Atlantic
Boeing
Contel
General Electric
GTE
Southwestern Bell
U.S. West
Western Union

Source: Federal Procurement Data Center latest available data

3. Turnkey Systems

This market is usually associated, at least in the federal market, with specialized applications in particular niche areas. As a result, the federal turnkey systems market is considerably smaller than that for systems integration. The leading vendors (Exhibit III-5) tend to be smaller firms that focus on specific government needs. Some of the vendors specialize in defense systems. Also, practically all the vendors provide specially adapted equipment, modified to satisfy unique system requirements.

EXHIBIT III-5

Leading Federal Turnkey Systems Vendors

Company
C3, Inc.
Computer Consoles
Computervision
Federal Data Corporation
Gould
Harris
Intergraph, Inc.
Prime
Tektronix
Triad

Source: Federal Procurement Data Center
Latest available data

Some vendors focus on a handful of agencies, providing CAD/CAM products to support defense and energy-oriented needs. On the other hand, graphics and drawing control systems have applications across a number of areas. Although training systems are heavily concentrated in defense and NASA, other agencies are now experimenting with trainers and simulators.

4. Applications Software Products

Federal industry-specific applications software products now capture more market share than turnkey systems. Although formerly the smallest of the six delivery modes, software is now growing faster than all except systems integration. The market is also the least concentrated. Even the leading firms (shown in Exhibit III-6) account for a very small portion of the market. In keeping with INPUT's classification of delivery modes, this delivery mode includes only government-specific software products, and not those used in cross-industry applications.

EXHIBIT III-6

Leading Federal Applications Software Vendors

- Candle Corporation
- Computer Associates
- Computer Corporation of America
- Computer Data Systems, Inc.
- Government Technology Services
- Integrated Software Systems
- Macheal-Schwendler Corp.
- Q S Inc.
- Sterling Software
- Universal Energy Systems

Based on Federal Procurement Data Center listing of applications software suppliers. Some suppliers are not software developers.

Federal agencies buy about 40% of their software, and lease the rest. Defense agencies and GSA put more emphasis on software maintenance than do other federal agencies. Further, some agencies oppose acquisition of copyright-protected software.

Qualification for the GSA Federal Supply Schedule permits direct agency purchases of software, up to the schedule's maximum order limitation (proposed for increase in 1990). To qualify for the schedule, vendors must usually offer discounts as large as those received by the vendor's "best customer," including foreign clients. Further, in most cases, the vendor must offer a purchase plan or permanent site license after a specified rental period. Under new GSA rules, software developers may now offer their products through a variety of channels.

5. Professional Services

Since the federal government is the largest consumer of professional services, it attracts the widest range of vendors. As shown in Exhibit III-7, system houses and hardware firms dominate this market. These firms require a broad range of in-house or consultant skills to meet systems integration and implementation requirements. In a departure from previous years, hardware firms are starting to provide the products and services of other firms, where appropriate, to meet the clients' needs.

In fact, virtually all professional services firms team with other firms in responding to major federal solicitations. Therefore, competition among the firms is becoming complicated by the continually changing teaming patterns. Professional services firms typically team on one project while simultaneously competing on another.

In devising bidding strategies for professional services firms, the availability of key project managers and technical specialists becomes paramount. In DoD, particularly, agencies want project managers who are familiar with the agency. Retired military officers often make good project managers, at least in terms of proposals. However, the retired officers need to learn the culture of the contractor. For example, a federal project manager would typically want the best people available. However, this is not the case among contractors, where a project manager cannot afford the best people available. Rather, he or she needs to leverage the senior talent and use junior, less expensive people to satisfy most of the client's needs.

EXHIBIT III-7

Ranking of Leading Federal Professional Services Vendors

Company	Rank*
Computer Sciences Corporation	1
Unisys	2
SAIC	3
TRW	4
CDSI	5
Grumman Data Systems	6
Harris Corporation	7
PCR/Emhart (Black & Decker)	8
EDS/General Motors	9
McDonnell Douglas	10

* Rank based on market share of latest available reported contract obligations and direct vendor surveys.

Some other characteristics of this market include:

- Increasing use of fixed-price bids
- Client-directed use of subcontractors, such as Big Eight (now Big Five) accounting firms
- Growing importance of corporate reputation
- Use of software development tools, especially programmer and analyst workbench tools

6. Systems Integration

Given the size and growth of the federal systems integration (SI) market, it is not surprising that the competition is fierce. Some vendors compete in several categories because they offer products and/or services for a variety of commercial and government market sectors, including:

- Specialized integrated systems
- Midsize microcomputer-based systems
- Midsize microcomputer-networked distributed data systems
- Large CPU-based systems with or without distribution networks
- Supercomputer systems

In the latter category, the systems frequently function as hosts for several mainframes, which in turn support distributed midsize computers and microcomputer terminals.

The top ten SI vendors (Exhibit III-8) are all well-known companies in the federal information systems marketplace. Revenue estimates for Grumman Data Systems were adjusted to eliminate support specifically allocated for weapons systems.

C
Competitive Factors

1. Industry Influences

Most executives of the federal vendor community have become increasingly pessimistic in their outlook for the information systems market. Some recent federal events and trends need to be given consideration in developing marketing strategies for the 1990s. In spite of the cuts of defense spending, vendors foresee continued defense outlays for renewals/upgrades of older systems. The larger systems and future acquisitions will be subjected to much closer scrutiny by both oversight agencies and the Congress, and a number will be delayed or cancelled.

Vendors are also becoming concerned that the trend among federal agencies to consolidate contracts may eliminate prospects for new projects and recompetition of existing programs. However, these larger contracts have also brought about additional subcontracting and teaming opportunities. In addition, there has been a recent shift toward re-examining "Grand Design" procurements and acquiring smaller modules in order to reduce the risk to the government.

EXHIBIT III-8

Ranking of Leading Federal Systems Integration Vendors

Company	Rank*
IBM	1
EDS	2
Martin Marietta	3
SAIC	3
CSC	3
Unisys	6
Boeing Computer Services	7
Grumman Data Systems	8
PRC/Emhart (Black & Decker)	9
Control Data Corporation	10

* Based on 1989 revenues

Vendors must now face increased scrutiny of their business and ethical conduct during procurements as a result of the Procurement Integrity Act. This newly enacted legislation focuses on keeping procurement "pure" from unauthorized influences. The agencies reacted to the legislation by becoming more restrictive in disclosing information on pending and future procurements, thus making marketing to the government more difficult. Vendors will need to develop other legitimate sources of acquiring information on procurements.

The Ethics in Government Act, which was actually a Congressional pay raise, suspended the Integrity Act for one year. However, this suspension relates primarily to the post-employment restrictions of the Act, rather than contractor relations. INPUT expects contractor relations to become even more difficult in 1990.

2. Recommended Strategies

Exhibit III-9 shows several recommended strategies for the federal market. Vendors to the federal government must accept the fact that, while program managers may prefer incentive contracts, most contracting officers intend to do business on a fixed-price basis. Vendors must find, and put into practice, methods of pricing and managing professional services contracts that allow them to minimize the risk of performance on a fixed-price basis, or they will not be able to compete successfully in the government marketplace. To minimize costs and remain competitive, vendors must make maximum use of automated tools to increase their productivity. In some cases, even this may not be enough, as more contracts are being won through buy-ins.

EXHIBIT III-9

Recommended Strategies

- Maximize pricing strategies
- Comply with new federal standards
- Vertically penetrate agency customers
- Maintain positive reputation
- Direct marketing efforts to reflect political emphasis on programs
- Capitalize on specialized expertise
- Target markets

Vendors should vertically penetrate potential agency customers to better understand the agency mission and functions and to solve the agency problems, not modify the problem to meet an available solution. Much can be accomplished by stressing the benefits to the customer, rather than the benefits of the service. This is particularly relevant in the area of systems integration.

Vendors should also be aware that, especially in the civil agencies, their reputation is an important factor in whether they can win work with an agency. The government is a "small community," and a questionable reputation in one agency can impede getting work in another. Overcoming a "poor" reference can take a long time. It is extremely important that vendors regularly and systematically survey their agency customers to determine problems, satisfaction levels, trends, and opportunities. This should not be done through the field staff but by a central organization. In at least part of the survey, an independent third party should be employed to prevent biases and provide objective standards.

Vendors can make more effective use of their marketing budget if they emphasize their marketing in areas that are politically popular. In election years, Congress reacts to programs that gain or hold votes. In presidential election years, budgets are more likely to emphasize domestic issues than technology or defense.

Furthermore, any product or service that stresses standards or interoperability will likely be attractive to the government. Vendors should exhibit to the federal agencies their ability to comply with specified standards and their awareness of the latest technology. Also, vendors need to show that they have the specialized expertise and personnel to supplement the agency's in-house staff.

INPUT surveys of government agencies revealed projected increases in the amount of future contracting of systems operations. In addition, similar increases are projected for software development. This type of work requires specialized expertise that not all vendors possess; however, vendors that do should ensure that they take advantage of this potential growth area. These areas may not always be attractive as developing state-of-the-art systems, but they are less risky and often financially more rewarding.

3. Industry Teaming Activities

In response to increased competition and larger procurements in the federal market, vendors have increased their teaming activities. The type of vendors that companies ally with varies due to the nature and complexity of the RFP.

Hardware and professional services firms are often cited as potential teaming partners. The mix of equipment and staffing skills available between these two types of companies can satisfy many of the equipment and service requirements of federal agencies. Furthermore, many hardware and professional services firms are already recognized leaders in the federal market.

Vendors frequently team with 8(a) firms or small businesses. This stems from the trend at federal agencies to set aside selected contracts for minority and small businesses. Teaming with small businesses will increase as compliance with legislation promoting small companies is observed by additional contractors.

Suggestions on how to improve teaming relationships with other vendors are summarized in Exhibit III-10. The industry recognizes the need for more cooperation and flexibility in establishing prices among teaming partners. This in turn would increase the team's chances of submitting a more cost-competitive bid. Vendors also see the need for tighter control of projects. This suggested improvement denotes vendor dissatisfaction with previous project management and supervision of some companies' efforts.

EXHIBIT III-10

Suggestions for Improved Industry Teaming Relationships

- Pricing flexibility
- Tighter control of project
- Better defining of requirements
- Use key staff
- Improve use of company resources

In addition, the vendors noted their shortcomings in defining the requirements of a program. Better identification of requirements would aid in developing stronger and more-suitable teaming of companies and their resources for improved responsiveness to agencies' needs.

In their suggestions, vendors also mentioned the need to improve the utilization of key staff and other company resources. Allocation of additional staff expertise and management needed to improve operations would benefit companies' reputations in the long term and earn them more credibility with agencies.

D

Vendor Profiles

Volume II of this report contains profiles of the following vendors:

- Advanced Technology, Inc.
- BDM International, Inc.
- Boeing Computer Services
- Cincinnati Bell Information Systems, Inc.
- Computer Data Systems, Inc.
- Computer Sciences Corporation
- Electronic Data Systems Corporation
- Integrated Microcomputer Systems, Inc.
- Planning Research Corporation
- Sterling Software, Inc.
- Softech, Inc.
- Syscon Corporation
- Telos Corporation

IV

User Issues and Directions

A

Major Issues and Driving Forces

1. Major Issues

The federal agencies face several major issues as they modernize and expand their information systems. These issues are shown in Exhibit IV-1. Cost containment will be a key issue to the government agencies, due to the combined pressures of Congress and the continuing slowdown in R&D expenditures. Defense in particular has sustained significant budget cuts. Many small vendors that had federal contracts experienced a reduction in profits. Also, to keep costs within the government's control, competitors are now required or encouraged to submit fixed-price bids on most systems integration and IS upgrade projects.

EXHIBIT IV-1

Federal Government Sector Agency Issues

- Cost containment
- Acquisition reforms
- Budget deficit control measures
- Regulations imposed on agency
- Internal agreement on requirements
- Availability of skilled staff

Several new acquisition, management, and use procedures have been incorporated into the Federal Information Resource Management Regulations (FIRMRs) and others are still pending. The reforms are intended to streamline the purchasing process while improving the amount of competition. A number of improvement initiatives already underway include:

- "GO FOR 12," a joint agency program to reduce the acquisition process to 12 months
- "TRAIL BOSS," a GSA program for increasing the acquisition authority of selected government program managers
- "FAR (Federal Acquisition Regulations) Streamline," a new initiative to further reduce the volume of the regulations and employ conventional business terminology

With two recent changes in management at GSA, there will likely be further changes in IRM policies and procedures.

Budget deficit control, whether provided under the terms of the Gramm-Rudman-Hollings Act or direct congressional action, is expected to impact the rate and/or extent of IS modernization in the agencies. Continuing economic and political sensitivity to the large national budget deficit could negatively impact a number of acquisitions in the "less-than-critical" defense and civil technology sectors. Even some programs widely considered critical are taking minor cuts. Major ADP systems already approved are likely to continue in preference to new and unapproved programs.

The complex and lengthy regulations imposed on the agencies are viewed by many as a severe impediment to systems acquisitions and software development. Combined with a lack of internal concurrence and management interest in extending information automation, these two issues are of concern to the agencies as they plan systems acquisitions and utilization of new information technology.

Furthermore, the federal government does not currently have the in-house staff required to support the quality or quantity of ADP-supported services demanded by Congress and by the American people. The agencies' personnel policies contain outdated standards and job descriptions and impose severe administrative problems. Some resolutions to these problems are being developed. Currently, agencies are working with the Office of Personnel Management to upgrade procurement professionals and give greater support for contracting personnel.

2. Driving Forces

The driving forces behind the federal market for information systems are summarized in Exhibit IV-2. The federal government was the first wide-based employer of large data processing capabilities. Despite an inventory in excess of 14,000 systems (not counting microcomputers), current IS resources are having difficulty meeting rising service demands. The reasons are:

EXHIBIT IV-2

Federal Government Sector Driving Forces

- Rising service demands
- Equipment obsolescence
- High maintenance costs
- End-user computing needs
- Connectivity requirements
- Improved security/privacy demands
- Presidential priority programs

- Public service functions, such as social security, welfare, and health and human services, continue to escalate under congressional initiatives (although repeal of the Catastrophic Health Insurance Act caused the cancellation of a major network procurement at HCFA).

- Congress needs newer, more frequent, and more timely data and analyses from the departments and agencies it oversees, leading to greater standardization in reporting requirements.

- Administrative initiatives continue to uncover areas of executive branch information processing that are missing or inadequate to meet new management expectations.

Though not as pronounced as in the early 1980s, the ADP Equipment (ADPE) inventory includes a significant number of third-generation machines that lack the flexibility, speed, reliability, and capacity of currently available technologies.

The combination of older ADPE and a very large inventory of custom software has driven maintenance costs up and extended repair times. GAO and NBS have estimated that about 70% of software life cycle costs go to maintenance and enhancement, and tie down an inordinate percentage of in-house IS staff.

Government personnel and managers requiring data processing support through end-user computing need dynamic response from data centers. Both volume and complexity are increasing, along with demands for more user friendly computing support.

The need to share data under the constraints of the Amended Paperwork Reduction Act and to interact to meet administration requirements—including the Reform '88 and successor initiatives, CALS, and SDI initiatives—will require substantially improved connectivity. New standards are needed for uniform protocols, open system architectures, and standard systems interconnections. However, some resistance continues, especially to GOSIP, as some agencies seek to retain their TCP/IP systems.

Administrative and congressional demands for improved security measures raise both national security and individual privacy protection issues. Congress is also considering new computer theft and proprietary data protection measures, which will affect both commercial and individual privacy, as well as national security. However, the consensus of agency respondents is that something drastic will need to happen before IS security is properly funded.

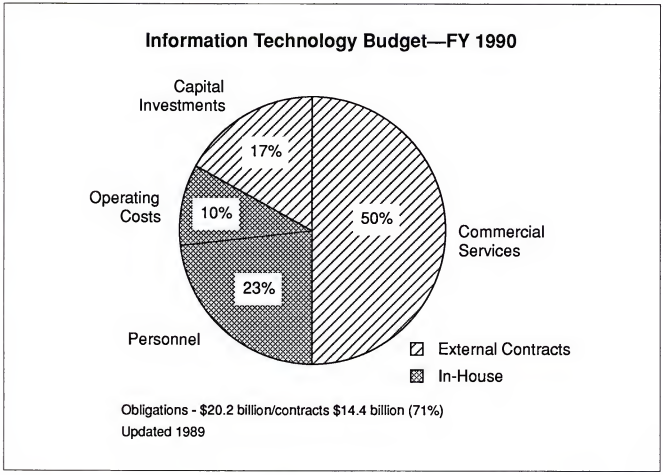
The large number of new and replacement information systems in the procurement process require a priority process, to assure completion of those associated with key administrative initiatives. In the fiscal year 1990 Report on Management of the United States Government, 10 systems have been designated "Presidential Priority Systems." Investments in these systems total $1.4 billion in the 1990 budget. Systems are selected as Presidential Priority Systems because of their size, complexity, or sensitivity, or because they represent new applications of technology.

B

Information Technology Budget Analysis

The annual information systems (IS) budget (referred to as Information Technology in the federal government) that supports the various federal department missions is categorized by the OMB A-11 Budget Process in terms of the basic components needed to acquire and operate IS, namely capital investments, commercial services, operating support, and personnel. These categories and their respective shares of the 1990 (IS) Information Technology Budget request (software, services, hardware, and systems) are displayed in Exhibit IV-3. It should be noted that some programs are industrially funded and therefore are not included in the A-11 submissions.

EXHIBIT IV-3



The types of activities supported under each of these categories are as follows:

- Capital Investments. The lease or purchase of all ADP equipment, telecommunications equipment, software, and physical facilities, excluding embedded computers and classified systems. (INPUT's report excludes physical facilities and equipment.)

- Commercial Services. Timesharing services, telecommunications services, systems operation, systems design and software development, consulting, software/hardware maintenance, education and training, and other external costs, including requirements analysis, risk analysis, and studies of advanced technology.

- Equipment Lease and Operating Costs. Day-to-day costs of operating information systems, including lease of hardware and software. (INPUT's report excludes all of this.)

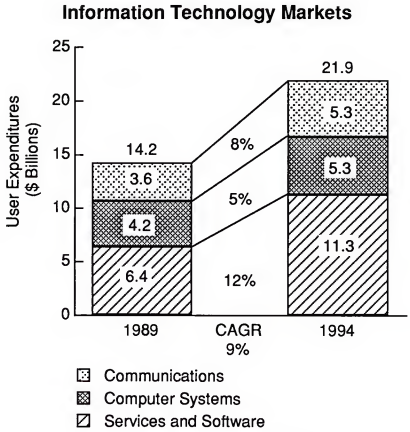
- Personnel. Salary, benefits, and travel costs associated with personnel employed directly by the government. (INPUT also excludes all of this.)

The 1990 IS budget of $20.2 billion represents 2% of the total government budget. This is slightly higher than the 1989 portion. In prior years (1982 to 1985), there was a 33% increase in this fraction.

Although the total IS budget has increased 47% in constant dollars since 1982, the period of rapid growth ended in 1985 with a 20% increase over the previous year. The 1990 increase over 1989 will be 5% in current dollars and unchanged in constant dollars.

Between 1989 and 1994 the contracted portion of the federal information systems budget is expected to grow from $14.2 billion to $21.9 billion, a CAGR of 9%. This represents a slight decrease over last year's forecast of a 10% CAGR. The difference appears in the hardware budget, which was actually cut at many agencies, and overall will grow at only 5% a year, as shown in Exhibit IV-4. Much of the software and services spending results in cross-industry and site spending, which are not included in INPUT's industry-specific forecasts.

EXHIBIT IV-4



The forces behind this growth were discussed in Chapter II. In particular, the software and services market is being driven by:

- Greater functionality expectations of agency users
- Sharply reduced availability of technical specialists within the government
- Increased emphasis on standards, certification, connectivity, and interoperability
- Greater pressure to contract work out, especially during Republican administrations

These factors will continue to drive the federal software and services market over the forecast period.

The federal market for computer systems will lag behind the growth of other areas. In particular, INPUT expects a dampening in the growth of demand for mainframe systems. Microcomputers are also beginning to reach a saturation point at some agencies. Demand is also expected to lag behind the market. Contrary to some published reports, INPUT expects the federal midsize market to remain fairly vigorous.

At the high end of the scale, INPUT expects continued brisk growth in the supercomputer market. First, traditional users, such as Energy, NASA, and some defense users will continue their demand. In addition, other users, particularly on the DoD side, are establishing supercomputer-based networks to solve nontraditional problems through greater resource sharing.

Telecommunications expenditures will increase as the government takes advantage of the new technology becoming available through the FTS 2000 contracts. Also, the greater need for information sharing will enhance the need for more sophisticated telecommunications features and services.

Various information systems budget items have experienced widely differing growth over the past two years, as shown in Exhibit IV-5. In several cases, projected expenditures for 1989 were not realized because of protests or other procurement problems. This shows up as negative growth in 1988. As the procurement problems abate, the year-to-year budget growth should smooth out.

EXHIBIT IV-5

Information Services Budget Distribution and Growth (Percent)

Budget Category	Share of Annual Budget (Percent)		Year-to-Year Budget Growth	
	1988 Budget	1989 Budget	1988-1989	1989-1990
Personnel	23.6	23.0	(2.5)	9.5
Hardware				
- Mainframes	6.4	8.8	37.5	6.1
- Minicomputers	2.6	3.1	19.2	7.2
- Micros	0.9	1.2	33.3	3.9
- Mass storage	2.1	1.8	(14.3)	—
- Other	8.1	7.5	(7.4)	1.2
Total hardware	20.1	22.4	11.4	5.1
Communications	14.8	18.7	26.4	8.1
External products and services				
- Prof. services	14.8	17.1	15.5	10.4
- Proc. services	5.2	2.6	30.1	9.0
- Appl. software	2.3	2.5	8.7	22.1
- Systems software	1.5	1.3	(13.3)	6.8
- Turnkey systems	4.3	4.2	(2.3)	1.0
- Software maint.	0.8	0.6	(25.0)	2.2
- Hardware maint.	8.4	5.8	(31.0)	(4.5)
- Other	2.0	1.0	(50.0)	(8.2)
Total external	39.3	35.1	(10.7)	3.5
Other	2.2	0.8	(64.0)	10.5
Total budget	100.0	100.0	8.9	9.1

Updated 1989

C

Applications Development Trends

The federal government sector's trends for applications on large-scale and midsize systems are shown in Exhibit IV-6. This exhibit is compiled from the descriptions of selected federal information systems and services in INPUT's Procurement Analysis Reports (FISSP). The applications are classified as either from a civilian or defense agency, and include those from both large-scale and midsize computer systems that are to be acquired, upgraded, or replaced by federal agencies.

The civilian agencies sampled most often designated their large-scale information systems for information analysis, research, and mission support applications. However, these same civilian agencies targeted management systems, human resources, accounting, and word processing most frequently for midsize operations. Large systems are still emphasizing applications of a centralized nature. Midrange computers, or minicomputers, now play a vital role in the increasingly decentralized and networked environments in governmental user organizations. The federal user community is demanding powerful shared resources that can handle a myriad of department and data center functions.

Information analysis, scientific and engineering support, logistics, and mission support are the most frequent application areas for the defense agencies. For the midsize systems, logistics, along with word processing, graphics, and electronic mail comprise the largest categories of application areas. Specific technical applications, such as those identified as scientific, made up a rather small portion of applications run on DoD minicomputers.

Federal agencies (including Army, Navy, DLA, HHS, Interior, and Education) are planning major upgrades of systems for human resources, management, graphics, and logistics and distribution applications. Part of this thrust reflects an increasing awareness by agency executives of the uses of their information. This is being shown particularly in the area of logistics. A significant portion of system upgrades by the defense agencies focuses on their existing systems that are to be upgraded with the CALS initiative rather than through acquiring new systems.

Replacement of systems is most noted in office automation, information analysis, and scientific/engineering applications, where rapidly changing hardware technology continues to obsolete these systems rapidly. Some agencies have planned for new starts in the "traditional" areas of information analysis and administration. In general, these programs represent attempts to bring computer-based productivity improvements to the functional operations of the agency.

EXHIBIT IV-6

Federal Government Applications Areas

Application	Proportion of Agency Respondents (Percent)			
	Civilian Agencies		Defense Agencies	
	Large-Scale Systems	Midsize Systems	Large-Scale Systems	Midsize Systems
Information analysis	18	6	11	8
Research	18	—	5	—
Mission support	14	—	7	—
Logistics and distribution	4	—	16	12
Budget & finance	11	—	12	—
Scientific/engineering	10	6	18	4
Project management	6	6	3	4
Administrative	2	9	3	4
Human resources/payroll	2	13	5	4
Word processing	—	13	—	16
Electronic mail	—	9	—	12
Electronic publishing	—	9	—	8
Graphics	—	—	—	12
Accounting	—	13	7	8
Management systems	—	16	5	8
Distributed processing	4	—	5	—
Planning	2	—	3	—
Training	—	—	—	—
Other	9	—	—	—
Total	100	100	100	100

Data based on surveys conducted for INPUT's FISSP reports during 1989

Another trend in federal government applications is downsizing larger system applications to microcomputers. The applications mentioned most frequently by federal agencies are identified in Exhibit IV-7. This data was compiled from surveys conducted for FISSP market analysis reports in 1989.

EXHIBIT IV-7

Applications Being Downsized to Microcomputers

Application	Rank*
Accounting	1
Inventory	2
Financial	3
Management systems	4
Data entry	5
Information processing	6

* Rank based on frequency of mention in survey for INPUT's federal microcomputer market report.

Accounting and inventory were the applications most often cited, followed by other financial applications. This downsizing is probably the result of the federal agencies' increased reliance on commercially available spreadsheet packages geared to microcomputers. Management systems were also mentioned. Some agencies are supplementing their mainframes' management systems, while other agencies are off-loading most parts of their management system to micros. In addition, general data entry and information processing (mission-oriented systems) are being downsized by agencies. As more-powerful systems (386- and even 486-chip technology) become readily available, the downsizing trend will likely accelerate. However, if the process is not properly managed, interoperability demands will likely suffer.

D
Objectives and Plans

1. IS Objectives

The objectives of the federal government sector are shown in Exhibit IV-8. Integration of voice, image, text, and data interchange within a single digital system is a key objective of GSA's FTS 2000 telecommunications project being implemented in the 1990s. An all-digital system would more readily permit encryption for security reasons and allow use of more cost-effective fiber optic transmission methods.

EXHIBIT IV-8

Federal Government Sector Objectives

- Voice-data integration
- Improved end-user support
- Increased software product applications
- Relational data bases
- Departmental information processing
- Transparent connectivity
- Decision support systems

Improved, user friendly data processing resources are key objectives of most current systems projects. A primary objective is improved data base availability, with associated protective measures in both hardware and software that respond to end-user needs. Vendors to the federal market are becoming more aware of government users' need to readily access data and distribute information among agency sites.

GAO, GSA, and NBS are pressing agencies to employ off-the-shelf or readily adaptable software products for a wide range of government applications that closely resemble commercial processes. Objectives include:

- Reduced time and cost of software development
- Improved maintainability of software
- Improved transportability of applications between processors

There is increasing pressure for installation of relational data bases equipped with SQL to meet the data retrieval requirements of a widening community of end users, which may also include the public. Agencies have started to acquire 4GL packages as one means of off-loading requests for ADP staff time.

The general concerns of potential government users of 4GLs are programmer productivity gains (during both the development phase and the maintenance cycle), performance and hardware resource considerations, and management issues. Frequently, the use of 4GLs, though improving programmer productivity, imposes an unacceptable burden on machine resources. However, with trends in downsizing to more powerful microcomputers, this burden matters less.

IS departmental processing emphasizes improvement of services to end users, with purchased products, improved and timely data bases, and technical support. Many of the federal government's midsize systems or department minicomputers are playing a vital role in the increasingly decentralized and networking environment of federal user organizations. The federal user community is demanding more-powerful computer resources that can handle the departmental and data center functions and also move into a distributed network environment.

Ultimately, current federal initiatives seek implementation of systems with transparent connectivity with users and other systems. Federal agencies are aiming for greater interoperability and connectivity throughout their information systems. One additional objective is the implementation of interface devices between office automation equipment and centralized data bases and other files. These will provide decision support systems to government executives, and are driving the growth of LANs in federal offices. Also, developmental artificial intelligence efforts are incorporating new technologies that provide useful decision aids to improve productivity.

2. New Applications

The sheer volume of transactions and complexity of operations within the federal government sector requires a constantly changing focus, as managers with an existing set of applications seek to apply new developments to a wide range of information service problems. (See Exhibit IV-9).

EXHIBIT IV-9

Federal Government Sector New Applications

- EDI—networks and services
- Computer-aided acquisition and logistic systems (CALS)
- Automated tax processing
- Standardized financial, payroll, and personnel systems
- AI applied to software development and simulation modeling

Electronic Data Interchange (EDI) represents a key emerging application. It accelerates the interchange of procurement, logistics, and other data, while improving the accuracy of these transactions. Since EDI uses conventional data processing and telecommunications capabilities, the emphasis in the federal sector will be development of vendor-furnished networks, software, and services to facilitate EDI implementation.

Currently, federal EDI is lagging behind the explosive growth of commercial EDI. With the exception of a few major programs, most EDI initiatives tend to be small pilot systems in which both government and vendors can assess costs. The recent awards for EDGAR at SEC and GSA's invoicing system may be changing this situation.

The CALS (Computer-aided Acquisition and Logistics Systems) Initiative of the Defense Department and NASA is a new application of automation of logistics to accomplish several goals:

- Integrate data life cycle elements in a source-to-use network
- Ensure compatibility of data interchange between logistic systems
- Automate the acquisition elements of:
  - Stock order processing
  - Shipping document generation and handling
  - Inventory analysis
  - Technical order (repair) system
  - Technical manual and documentation generation on a demand basis
- Demonstrate the initial design characteristics and criteria via selected projects
- Involve industry and government in implementation and utilization of the systems

Each of the major DoD agencies is proceeding with a wide range of CALS-related initiatives. However, some vendors have continuously expressed concern over data security and the lack of comprehensive standards. The DoD CALS policy office, in conjunction with the National Institute of Standards and Technology (formerly the National Bureau of Standards), is developing the necessary standards. However, much more must be done before the data security issues are resolved.

Automated tax processing applications are being developed on several fronts:

- Internal automation at the IRS Regional Centers, providing enhanced capabilities for:
  - Rapid conversion of tax forms to electronic form
  - On-line retention of several years' returns
  - Automated analyses to select returns that need detailed auditing (rather than sampling methods)
  - Automated preparation of refund payments

- External automation of the tax return process, allowing:
  - Electronic filing of individual returns
  - Electronic filing of small business returns involving more forms
  - Electronic fund transfers for tax payment and refunds

After a succession of GAO (General Accounting Office) audits that identified increasing incompatibility and decreasing accuracy of financial, payroll, and personnel systems, OMB has directed conversion or replacement of these systems by all agencies.

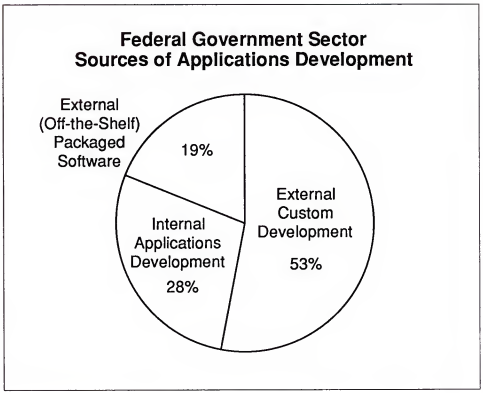
- Financial systems must meet a single set of standards and produce compatible products by 1992 (the Joint Financial Management Improvement Program is playing a major role).
- Payroll systems must meet new accuracy and timeliness standards and be compatible within military and civilian agencies by 1990.
- Personnel systems must be upgraded to meet all of the EEO and privacy protection criteria by the early 1990s.

Artificial intelligence/expert systems applications are moving to near-term implementation and availability in several areas. The Department of Defense has several pilot projects and initial programs underway in which AI provides assistance to human control functions. AI is also being employed to develop models for a number of applications, including the automated tax audit system, gaming for military training simulators, and automated logistics processes. Furthermore, AI is being tested for use in development of applications software to include automated documentation generation and selection of alternatives that minimize future maintenance problems. However, surveys show that decision support systems, in a variety of administrative and scientific environments, continue to be the primary use of AI in the government.

The federal government continues to be heavily dependent on custom development of new applications, partly based on a perceived need for government-unique solutions, and partly based on continuing dependence on a large inventory of early third-generation processors. This heavy dependence on outside development sources is illustrated in Exhibit IV-10.

The externally developed, off-the-shelf software package source has been given major impetus by the rapid growth of end-user personal computer use. Packaged software has also become available for minicomputers, of which the government has a large inventory. The share of application development by this source is expected to continue to grow.

EXHIBIT IV-10



Demands on the internal (in-house) IS staff to maintain older but critical custom software prevents them from assuming a bigger role in developing new systems. GAO and NBS surveys have demonstrated that more than 70% of software life cycle costs are expended on maintenance and undermanaged enhancements.

For now and the foreseeable future, the predominant source of major new application development will be external to the government. The majority of the development will come from professional services and software development firms. A smaller but very significant part of the development will come from universities and not-for-profit organizations, especially in AI, supercomputers, and automation applications. Ada usage will also grow sharply over the next few years.

3. Impact of Technology

Agency and industry representatives were asked to identify technological factors that would alter the federal government's spending for information services. The factors named most frequently are listed in Exhibit IV-11.

EXHIBIT IV-11

Technological Trends Affecting Federal Government Sector

Trend/Factor	Rank*
Expanded networks/LANs	1
Advancements in operating systems	2
Increased microcomputer capabilities	3
Improved imaging/graphics	4
Developments in artificial intelligence	5
Advancements in communications	6

* Rank based on frequency of mention by respondents to the FISSP federal market analyses.

The federal government is expanding its computer networks and use of local-area networks (LANs). Agency applications already directed to LANs include administration, project management, agency data bases, and finance. Over the next few years, mission support and personnel functions will also migrate to LANs in order to distribute information among various user groups.

Advancements in operating systems will support the interoperability needs of most agencies, and thus are ranked high. Increased computing power of microcomputers is also rated an important factor affecting future system requirements. Increased capabilities would hasten the downsizing of applications to microcomputers over the next five years.

New technologies for graphics and improved imaging are offering enhanced capabilities to agencies to support their information collection and analysis requirements. Advancements in these technologies will improve productivity at government agencies.

Artificial intelligence, or more specifically, expert systems, have already been employed in limited applications. New approaches that use AI include software development, process monitoring, and simulation. AI is also being used in tactical situations, automated planning, and support applications throughout DoD. However, currently decision support systems represent the most common federal applications for AI. Some examples include photographic analysis for NASA, tax auditing for IRS, and eligibility vertification for Social Security.

Advancements in communications will also influence government spending for information services. Some agencies will be acquiring newer technology through the FTS 2000 system. In other cases, agencies are planning their own upgraded telecommunications systems which will take their agency into the 1990s with greater ability to handle voice and data communications in an efficient and cost-saving manner.

V

Federal Market Opportunities

A

Applications Targets

There are different applications needs within and between agencies. Several emerging applications opportunities that should be targeted by vendors are listed in Exhibit V-1.

EXHIBIT V-1

Federal Government Market Applications Targets

- Management information systems
- Logistics support
- Financial/budgetary management
- Scientific computation capabilities
- Office systems end-user support

Major opportunities exist for applications that provide new management information systems. These applications represent upgrades or expansions of capabilities relating to day-to-day operations of federal ADP, and represent at least one-fifth of the different applications needs of both civil and defense agencies.

In particular, many large agencies require project tracking systems to respond more rapidly to ad hoc queries from the Congress and various oversight agencies. Increasingly, agency executives require management systems for external as well as internal needs, to insure prompt reporting of project status.

Electronic Data Interchange (EDI) applications are emerging that will accelerate the interchange of procurement, logistics, and other data. Major EDI (and a related approach, CALS) projects are now being awarded. EDI will emphasize development of software and network services as current pilot projects are implemented. General Electric, McDonnell Douglas, and Martin Marietta are supplying network services for the federal EDI market. There is no predominant software provider. Furthermore, EDI is unique in that it uses standard general-purpose business hardware.

Data management capabilities and data base management systems will become particularly popular as agencies attempt to organize their information resources to meet ever-growing end-user demands. DoD agencies in particular will require applications in this area. For example, the Army is using ADR software (now provided by Computer Associates) for its ASIMS/VIABLE program. This use of ADR software with SQL has given Computer Associates a major hold on the market. The four competitors with similar market penetration in other agencies include Oracle, IBI, CINCOM, and CULLINET.

Improvements to the federal government's administrative and logistics systems are required to bring these types of applications up to a level of efficiency realized in the commercial marketplace. The DoD has initiated the CALS program, which has drawn industry leaders such as CSC, General Electric, and TRW into the arena in bidding for this large project. The civilian agencies seem to require even more support in this area of logistics, but may not do so on as large a scale as DoD.

With increasing congressional pressure on agencies to institute better money management practices, financial management and budget applications have also received greater priority, particularly in civilian agencies. As mentioned earlier, GSA's Joint Financial Management Improvement Program (JFMIP) has awarded contracts to American Management Systems and Computer Data Systems, Inc. for certain Core Compliant Software. However, additional vendors will be approved for supplying modifications to software packages for certain computer platforms. Oracle, in particular, has announced products for multiple platforms.

Scientific applications are most prevalent in the space exploration, energy, weapons development, and physical science projects of DoD, Commerce, NASA, and Energy. Currently, most scientific applications

are being provided by vendors such as CSC, Boeing Computer Services, PRC, and several others that can provide programming, analysis, and large-scale support at individual agency centers.

Office automation applications, while commanding a smaller share of the various applications, should be particularly fruitful for vendors that offer solutions for the integration of incompatible hardware and the need for increased end-user support.

Little of the federal office systems market comes from contracts containing only the office systems Federal Supply Code (FSC 7435). Fifty times that amount comes from bundled contracts that include things other than office systems. Thus, the best application opportunities will come from those areas representing a variety of disciplines, rather than purely office systems.

B
Software Management

A particular concern surrounding these application targets is software management (see Exhibit V-2).

EXHIBIT V-2

Federal Government Software Management Issues

- Transferability of commercial software packages
- Government preferences
- Compatibility/conversion of software
- Software maintenance

The government has some unique data processing needs that require unique computer applications and software. Many federal computer technology applications are not, however, fundamentally different from those of the private sector and could use available commercial software packages with few, if any, changes. The growth in software products sales is indicative of this trend.

The federal bias toward custom development has a high investment cost and is thus diminishing. Initial development of custom software is lengthy and labor-intensive, and subsequent modification is difficult. Utilization of development tools and practices such as software engineering by vendors on government contracts will be emphasized.

Transition to more modern, efficient hardware is often inhibited by large inventories of customized software that require conversion. There are many cases where large, modern computer systems are configured to emulate older, less-capable computers so that existing custom software can be run without modification. Automated conversion techniques and cross-compilers will be needed by conversion vendors to compete effectively in this market.

A decade ago, the average life expectancy of a software application was three to five years. Today, five to eight years is considered average. Yet many very large systems used by the federal government are more than twenty years old. Modern software engineering practices were not employed in the development of these older systems. As a result, they are very difficult and extremely expensive to maintain, yet vital to the proper functioning of an agency.

Some vendors will be contracted to provide appropriate transitions and maintenance of these systems. Others will provide flexible architectures for the identification and recovery of data in magnetic tape formats generated by systems and code versions no longer in use.

C

Turnkey Systems

There is a continuing interest by a number of agencies in the acquisition of turnkey, packaged ADP systems, where the available applications, system configuration, delivery time, and/or cost best meet the agency's needs.

A careful analysis of agency needs can lead to identification of system requirements that can be met nearly or completely by off-the-shelf turnkey systems:

- Vehicle maintenance, overhaul, and replacement systems created for commercial truck, taxi, and rental car fleets are directly adaptable.
- Facility and maintenance resource scheduling systems are equally adaptable.
- Many three-dimensional graphics systems and indexing systems are directly applicable to agency needs.

With relatively minor modifications, a number of other commercial turnkey systems can be applied to a range of government needs:

- CAD/CAM systems are nearly universal.
- Warehousing and inventory locater systems can be readily adapted to government systems.

There are some government-unique applications that can be satisfied by either extensively modified commercial systems or systems devised for employment by several agencies:

- ADP-driven trainers for a range of vehicles and services, such as electronic system maintenance, will be required.
- Simulators related to those developed for arcades have applications in a number of civil and defense agency training facilities.
- Digital mapping systems, an extension of engineering graphics and topology, will be acquired by a number of agencies.

FG-A

Appendix: Forecast Data Base

This appendix contains the following forecast information, as shown in Exhibit FG-A-1.

- Market size by delivery mode for 1988-1994
- Market growth rates for 1988-1989
- Compound annual growth rate (CAGR) for each delivery mode for the five-year period 1989-1994

EXHIBIT A-1

Federal Government Sector User Expenditure Forecast by Delivery Mode, 1989-1994 ($ Millions)

Sector by Delivery Mode	1988	Growth 88-89 (%)	1989	1990	1991	1992	1993	1994	CAGR 89-94 (%)
Total Federal Government Sector	7,415	13	8,382	9,341	10,448	11,718	13,166	14,837	12
Processing Services	460	9	499	542	591	649	717	797	10
- Transaction Processing Services	245	2	250	250	250	250	230	250	0
- Systems Operations	215	16	249	292	341	399	467	547	17
Network/Electronic Information Services	830	21	1,032	1,135	1,249	1,376	1,516	1,673	10
- Electronic Information Services	240	25	300	315	331	347	365	383	5
- Network Applications	610	20	732	820	918	1,028	1,132	1,290	12
Application Software Products	385	20	469	346	640	732	888	1,053	18
- Mainframe	105	11	117	126	136	147	159	171	8
- Minicomputer	130	15	150	167	188	210	235	263	12
- Workstation/PC	150	35	203	253	316	396	494	618	25
Turnkey Systems	390	6	613	426	439	452	465	479	3
Systems Integration	2,420	16	2,710	3,172	3,728	4,383	5,145	6,046	18
Professional Services	2,910	12	3,259	3,520	3,802	4,106	4,434	4,789	8

FG-B

Appendix: Federal Government Sector Reconciliation

This section outlines the differences between the current forecast for the federal government industry sector and that provided in last year's vertical report for years 1989 and 1993. Where substantial differences occurred, the reasons for these changes are provided. The forecast differences are summarized in Exhibit FG-B-1.

The 1989 market forecast, overall, dropped approximately 2% between last year's forecast and this year's. This was due primarily to a change in funding classification at the Health Care Financing Administration (HCFA), described in item #1 below, and a cut in projected hardware spending, affecting turnkey systems and systems integration.

1. Processing Services

Spending for 1989 declined 28% below last year's forecast. This reduction of the 1989 expenditures for transaction processing, from year to year, comes from the elimination of Health Care Financing Administration (HCFA) payments to state medicaid programs, which was previously included in HCFA's processing services budget. Systems operations spending declined 26% below last year's forecast, resulting primarily from delays in major recompetitions (such as the NASA, Ames Research Center contract) and delays in new procurements involving systems operations, including HUD's Integrated Information Processing System.

In 1993, transaction processing services will decline even further from last year's forecast, reflecting larger-than-expected growth in end-user computing. However, this lowered estimate will be partially offset by the improved growth of the systems operations seen in agency budget increases, especially in the civilian sector.

EXHIBIT B-1

Federal Government Sector Forecast Data Base Reconciliation User Expenditures by Delivery Mode, 1989 and 1993

Sector by Delivery Mode	1989 Market Year of Forecast			1993 Market Year of Forecast		
	1988	1989	Var (%)	1988	1989	Var (%)
Total Federal Government Sector	8,512	8,382	-2	14,037	13,166	-6
Processing Services	695	499	-28	905	717	-21
- Transaction Processing Services	358	250	-30	450	250	-45
- Systems Operations	337	249	-26	455	467	2
Network/Electronic Information Services	943	1,032	9	1,376	1,516	10
- Electronic Information Services	261	300	15	308	365	19
- Network Applications	682	732	7	1,067	1,152	8
Application Software Products	262	469	80	439	888	102
- Mainframe	65	117	80	94	159	69
- Minicomputer	89	150	69	136	235	73
- Workstation/PC	107	203	90	209	494	136
Turnkey Systems	423	413	-2	555	465	-16
Systems Integration	2,911	2,710	-7	5,758	5,145	-11
Professional Services	3,278	3,259	-1	5,004	4,434	-11

2. Network/Electronic Information Services

Network services spending for 1989 increased 9% above last year's forecast. The increase in electronic information services came from greater government acceptance of Electronic Data Interchange (EDI) than had been previously expected. Several major EDI contracts have been awarded in the past year, including the GSA award to GE Information Systems. Network applications spending grew 7%, due primarily to an expansion of scope of the FTS 2000 contract. This expansion has enhanced the available media technology, which in turn increased latent demand for network applications.

1993 spending projections also increased from last year's forecast. The overall growth of 10% reflected the same changes that drove up 1989 spending.

3. Applications Software Products

This year's estimate of 1989 spending nearly doubled that of last year, with actual 1993 spending doubling. The factors cited last year and repeated here continue to drive this market.

- GSA strengthened its program for analyst and programmer workbench tools. More vendors than expected now provide these tools, tailored to meet government needs.

- The Computer Security Act of 1988 created a new software growth industry in the government. Scores of software companies are rushing out products to help agencies comply with the Act and associated NIST regulations.

- The federal financial software market is also changing. In January 1988, the Joint Financial Management Improvement Program (JFMIP) office issued a new document, the Core Financial Systems Report. OMB mandated its observance, and GSA issued a solicitation for Core-compliant software. Two contracts have been awarded so far, and more are expected in the next year. This is preventing agencies from using cross-industry financial software, and thus is driving up demand for government-specific software.

4. Turnkey Systems

The federal turnkey systems market for 1989 declined only 2% between forecasts. A moderate reduction in hardware spending by most federal agencies is partially offset by the availability of software packages which meet federal needs. These packages enable vendors to put together off-the-shelf solutions to federal problems. Defense budget cuts for the 1990s (seen in Appendix FG-C), and agency plans to migrate to smaller systems integration solutions (described in #5 below), are expected to reduce spending for 1993 by 16%.

5. Systems Integration

The dollars spent for systems integration in 1989 decreased 7% from last year's forecast. As noted for turnkey systems, decreased federal hardware purchases lowered the 1989 market. 1993 spending projections are down by 11%, reflecting both lower hardware acquisition and slower implementation rates, especially in defense.

6. Professional Services

1989 spending for professional services decreased by less than 1% from last year's forecast. However, current projections for 1993 indicate a reduction of 11% from last year's forecast. The lower spending comes from increased use of software products, greater use of professional services within the systems integration category, and gradual reduction in the development and vendor maintenance of custom software. The growing functionality and availability of these projects will permit agencies to reduce their reliance on software development, thus lowering the overall professional services spending.

FG-C

Appendix: FY 1990 Department of Defense Budget Cuts

The following Defense Information Systems budget cuts were applied to the 1990 budget.

ARMY

	O&M	Procurement	($000) Total
Software development	-84,895	-	-84,895
Microcomputers	-40,000	-	-40,000
Maintenance	-30,000	-	-30,000
Training/Doctrine Command	-15,000	-4,236	-19,236
Competition	-20,000	-	-20,000
Forces Command	-15,000	-	-15,000
Software maintenance	-7,000	-	-7,000
Total Army Personnel System*	-5,692	-	-5,692
SIDPERS-3 (Standard installation/Division Personnel System)	-2,500	-	-2,500
European Command	-10,000	-	-10,000
FEDLINK (Library of Congress reimbursement)	- 5,000	-	-5,000
Theater Army Medical Info. Systems (TAMMIS)	-	-	-
Forces Command Info. System	-1,000	-	-1,000
Headquarters ADP	-1,986	-14,000	-15,986
Army Field Artillery Data System (AFATDS)	+7,395	-7,395	-
Army Standard Information Processing Systems (ASIPS)	-	-	-
Information Processing Equipment	-	-6,056	-6,056
Training Equipment	-	-	-
Army Material Command	-	-3,500	-3,500
Personnel Authorization	-	-4,000	-4,000
Total	**-230,678**	**-39,187**	**-269,865**

* Funding specifically denied

NAVY

	O&M	Procurement	($000) Total
Management practices	-40,000	-	-40,000
STAFS (Standard Automated Financial System)	-20,000	-	-20,000
FY89 reduction	-35,900	-	-35,900
Maintenance	-30,000	-	-30,000
Integrated Disbursing and Accounting Financial System (IDAFIPS)*	-19,610	-4,455	-24,065
Computer Aided Design/ Computer Aided Manufacturing (CAD/CAM)	-6,773	-	-6,773
Naval Air Logistics Management Information System (NALCOMIS)	-	-	-
FEDLINK	-5,000	-	-5,000
Automation of Procurement and Accounting Data Entry (APADE)	-600	-	-600
Stock Point Logistics Integrated Communications Environment (SPLICE)	-300	-1,900	-2,200
Stock Point ADP Replacement (SPAR)	-3,700	-15,000	-18,700
Uniform Inventory Control Point (UICP)	-10,000		-10,000
Total	**-171,883**	**-21,355**	**-193,238**

* Funding specifically denied

AIR FORCE

	O&M	Procurement	($000) Total
Maintenance	-30,000	-	-30,000
Depot Maintenance Management Information System (DMMIS)	-	-	-
Use of Air Force Computer Acquisition Center (AFCAC)	-20,000	-	-20,000
Personnel Concepts III	-	-18,200	-18,200
FEDLINK	-5,000	-	-5,000
Reliability and Maintainability Information System (REMIS)	-	-	-
Phase IV	-3,000	-	-3,000
Aeronautical Systems Division	-1,000	-	-1,000
Contract Services Support	-700	-	-700
Management Practices	-15,000	-	-15,000
Total	**-74,700**	**-18,200**	**-92,900**
DoD Agencies			
Defense Logistics Agency	-20,000	-20,000	-40,000
Defense Medical Support Activity	+10,000	+5,000	+15,000
Washington Headquarters Services	-10,000	-	-10,000
Total	**-20,000**	**-15,000**	**-35,000**
GRAND TOTAL	**-497,261**	**-93,742**	**-591,003**

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INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

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